

### Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

All claims currently being amended are shown with deleted text struckthrough or double bracketed and new text underlined. Additionally, the status of each claim is indicated in parenthetical expression following the claim number.

The current disposition of the claims are as follows: Claims 1-33 are pending in this Application; Claims 1, 3-26 and 28-33 are rejected by the Examiner; Claims 2 and 27 are objected by the Examiner.

In response, Applicant takes the following actions: Applicant cancels Claims 2, 8, and 27; Applicant amends Claims 1, 17, 21, and 26. Applicant traverses Examiner's objections and rejections to Claims 1, 3-7 and 9-26, and 28-33.

### WHAT IS CLAIMED IS:

1. (Currently Amended) A method comprising the steps of:
  - (a) covalently attaching species to the exterior of the fullerene carbon nanocage to form a derivatized fullerene carbon nanocage, wherein the derivatized fullerene carbon nanocage is a fluorinated fullerene nanocage; and
  - (b) inserting an endohedral doping agent into the derivatized fullerene carbon nanocage.
2. (Cancelled)
3. (Previously Presented) The method of claim 1, wherein the step of covalently attaching decreases the potential energy barrier for the step of inserting
4. (Previously Presented) The method of claim 1, wherein the fullerene carbon nanocage is selected from the group consisting of fullerenes, buckyballs, carbon nanotubes, nested

fullerenes, bucky onions, single-wall carbon nanotubes, multi-wall carbon nanotubes, carbon fibrils, and combinations thereof.

5. (Previously Presented) The method of claim 1, wherein the endohedral doping agent is selected from the group consisting of a charged species, a neutral species, ion(s), atom(s), atom clusters, molecules, and combinations thereof.
6. (Previously Presented) The method of Claim 5, wherein the endohedral doping agent is radioactive.
7. (Previously Presented) The method of Claim 5, wherein the endohedral doping agent is inserted via ion bombardment.
8. (Cancelled)
9. (Previously Presented) The method of Claim 5, wherein the endohedral doping agent decays into a radioactive species.
10. (Previously Presented) The method of Claim 1, further comprising removing at least some of the covalently attached species from the exterior of the fullerene carbon nanocage after the step of inserting.
11. (Previously Presented) The method of Claim 1, further adding bio-specific ligands or antibodies to the fullerene nanocage.
12. (Previously Presented) The method of Claim 11, wherein the step of adding occurs before the step of attaching.
13. (Previously Presented) The method of Claim 11, wherein the step of adding occurs during the step of attaching.
14. (Previously Presented) The method of Claim 11, wherein the step of adding occurs between the step of attaching and the step of inserting.

15. (Previously Presented) The method of Claim 11, wherein the step of adding occurs after the step of inserting.
16. (Previously Presented) The method of Claim 1, wherein the step of inserting comprises breaking and subsequent reformation of carbon-carbon bonds in the fullerene nanocage structure.
17. (Currently Amended) A method comprising:
  - (a) derivatizing a fullerene with a fluorine specie; and
  - (b) endohedrally modifying the fullerene.
18. (Previously Presented) The method of claim 17, wherein the fullerene is a fullerene tube.
19. (Previously Presented) The method of claim 18, wherein the fullerene tube is a single-wall carbon nanotube.
20. (Previously Presented) The method of claim 19, wherein the sidewall carbon nanotube is derivativized on the sidewall of the single-wall carbon nanotube.
21. (Currently Amended) A composition comprising:
  - (a) a fluorine-derivatized fullerene;
  - (b) a first species covalently attached to the fullerene; and
  - (c) a second species endohedrally located in the fullerene.
22. (Previously Presented) The composition of Claim 21, wherein the second species is selected from the group consisting of ions, atoms, molecules, and combinations thereof.
23. (Previously Presented) The composition of Claim 21, wherein the second species is radioactive.
24. (Previously Presented) The composition of Claim 21 further comprising a third species attached to the fullerene, wherein the third species is selected from the group consisting of bio-specific ligands, antibodies, and combinations thereof.

25. (Previously Presented) The composition of Claim 21, wherein, the first species is selected from the group consisting of bio-specific ligands and antibodies.
26. (Currently Amended) A composition comprising:
  - (a) fullerene carbon nanocage;
  - (b) a first species covalently attached to the fullerene carbon nanocage, wherein the first species covalently attached to the fullerene carbon nanocage is fluorine; and
  - (c) a second species endohedrally located in the fullerene carbon nanocage.
27. (Cancelled)
28. (Previously Presented) The composition of Claim 26 further comprising a third species attached to the fullerene, wherein the third species attached to the fullerene carbon nanocage is selected from the group consisting of bio-specific ligands, antibodies, and combinations thereof.
29. (Previously Presented) The composition of Claim 26, wherein the second species endohedrally located in the fullerene carbon nanocage is a radioactive species.
30. (Previously Presented) The composition of Claim 29, wherein the radioactive species is selected from the group consisting of  $T^+$ ,  $T_2$ ,  $^3He$ , cobalt isotopes of small ionic radius, and combinations thereof.
31. (Previously Presented) The method of Claim 26, wherein the fullerene carbon nanocage is a fullerene tube.
32. (Previously Presented) The method of Claim 31, wherein the fullerene tube is a single-wall carbon nanotube.
33. (Previously Presented) The method of claim 33, wherein the sidewall carbon nanotube is derivatized on the sidewall of the single-wall carbon nanotube.